AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims

1. (original) A method of promoting highly efficient antigen presentation in a mammal comprising:

a) exposing ex vivo or in vivo dendritic cells from said mammal to either of the following:

i) a conjugate comprising a preselected antigen covalently bound to an antibody to DEC-205; or

ii) a recombinant anti-DEC-205 antibody, wherein said antibody has been genetically modified to contain at least one preselected antigen on at least one preselected site on said antibody molecule; and

b) promoting maturation of said dendritic cells ex vivo or in vivo by combining the antigen/anti-DEC-205 complex of either of i) or ii) of step a) with a dendritic cell maturation factor;

wherein the combination of steps a) and b) results in highly efficient antigen presentation in said mammal.

2. (original) A method of promoting highly efficient antigen presentation in a mammal comprising administering a recombinant anti-DEC-205 antibody to said mammal, wherein said antibody has been genetically modified to contain at least one preselected antigen and at least one dendritic cell maturation factor, each on at least one preselected site on said antibody, and wherein said administering results in delivery of said antigen to said dendritic cell, maturation of said dendritic cell and promotion of highly efficient antigen presentation.

3. (original) The method of either of claims 1 or 2, wherein said preselected site on said antibody is on the heavy or light chain of said antibody, or on fragments thereof.

4. (original) The method of either of claims 1 or 2, wherein said method results in induction of a long term cellular and/or humoral immune response in said mammal.

5. (original) The method of claim 4, wherein said method results in said antigen being about 500 times more effective in inducing a long-lasting T cell response and in expanding antigen-specific CD4+ and CD8+ T cells in the mammal, as compared to an antigen administered without an anti-DEC-205 antibody and without a dendritic cell maturation factor.

6. (original) The method of claim 4, wherein said method increases the efficiency with which the antigen initiates CD4+ and CD8+ immunity from the polyclonal naive T cell repertoire in vivo.

7. (original) The method of either of claims 1 or 2, wherein said anti-DEC-205 antibody is a polyclonal or a monoclonal antibody.

8. (original) The method of claim 7, wherein said antibody is selected from the group consisting of a human antibody, a murine antibody that reacts with human DEC-205 protein, a humanized antibody, and a human-chimerized antibody.

9. (original) The method of claim 8, wherein said antibody is a monovalent or single chain antibody.

10. (original) The method of claim 5, wherein the T cell response is selected from the group consisting of a cytolytic T cell response, a helper T cell response and a memory T cell response.

11. (original) The method of either of claims 1 or 2, wherein said method results in priming of CD8+ T cells specific for the preselected antigen, and wherein said preselected antigen is a non-replicating and/or subunit vaccine.

12. (original) The method of claim 11, wherein said vaccine is composed of antigens selected from the group consisting of a tumor vaccine, a viral vaccine, a bacterial vaccine and vaccines for other pathogenic organisms for which a long lasting immune response is necessary to provide long term protection from infection or disease.

13. (original) The method of claim 12, wherein said viral vaccine is selected from the group consisting of a DNA viral vaccine, an RNA viral vaccine or a retroviral vaccine formed with the antibody combining function of the anti-DEC-205 antibody.

14. (original) The method of claim 11, wherein said vaccine is administered as a single dose.

15. (original) The method of claim 14, wherein said single dose is sufficient to elicit a long lasting immune response.

16. (original) The method of claim 14, wherein said vaccine is effective when administered without adjuvant.

17. (original) The method of claim 14, wherein said single dose of vaccine, when administered at levels of about 10 to 1000 fold lower than the level of a vaccine administered without an anti-DEC 205 antibody and without a dendritic cell maturation factor but with an adjuvant, results in highly efficient antigen presentation and induction of long lasting immune responses.

18. (original) The method of claim 14, wherein said vaccine is administered at a single dose of about 1 mg to about 10 mg.

19. (original) The method of claim 14, wherein said vaccine is administered at a single dose of about 1 μg to about 10 μg.

20. (original) The method of claim 14, wherein said vaccine is administered at a single dose of about 10 ng to about 100 ng.

21. (currently amended) The method of ~~any one of claims 11-20~~ claim 11, wherein said vaccine is administered subcutaneously, intramuscularly, intravenously, intranasally, orally, mucosally, bucally or sublingually.

22. (original) The method of claim 17, wherein said immune response is a cellular or humoral immune response.

23. (original) The method of claim 22, wherein said cellular immune response is selected from the group consisting of a cytolytic T cell response, a helper T cell response and a memory T cell response.

24. (original) A method for increasing the persistence of MHC class I: antigen complexes in a mammal comprising:

a) exposing ex vivo or in vivo dendritic cells from said mammal to either of the following:

i) a conjugate comprising a preselected antigen covalently bound to an antibody to DEC-205; or

i) a recombinant anti-DEC-205 antibody, wherein said antibody has been genetically modified to contain at least one preselected antigen on at least one preselected site on said antibody molecule; and

b) promoting maturation of said dendritic cells ex vivo or in vivo by combining the antigen/anti-DEC-205 complex of either of i) or ii) of step a) with a dendritic cell maturation factor;

wherein the combination of steps a) and b) results in persistent presentation of antigen in the context of MHC class I antigens such that persistence of MHC class I: antigen

complexes in said mammal results in induction of a long lasting T cell response specific for said antigen; and wherein such persistent presentation of antigen is analogous to a systemic infection as evidenced by presentation of antigen in most lymphoid tissue.

25. (original) The method of claim 24 wherein said MHC class I: antigen complexes persist in vivo in multiple lymphoid sites from about 15 to about 30 days.

26. (original) The method of either of claims 1 or 2, wherein said method results in induction of mucosal immunity specific for said predetermined antigen.

27. (original) The method of claim 12, wherein treatment of a mammal with said tumor vaccine results in tumor regression in vivo.

28. (original) The method of claim 27, wherein said tumor regression is associated with an increase in a tumor specific CD8+ cytolytic T cell response.

29. (original) A vaccine composition for inducing long term cellular or humoral immunity in a mammal comprising a mixture of :

a) an immunogenically effective amount of an antigen for which induction of long term cellular or humoral immunity is desired, said antigen prepared by either
    i) conjugating said antigen with an anti-DEC-205 antibody; or
    ii) utilizing a recombinant anti-DEC-205 antibody, wherein said antibody has been genetically modified to contain at least one preselected antigen on at least one preselected site on said antibody molecule;
b) a dendritic cell maturation factor;
c) a pharmaceutically acceptable adjuvant; and

wherein said vaccine composition is effective when administered at levels of about 10 to 1000 fold lower than the effective dose of a vaccine which is not conjugated to an anti-

DEC-205 antibody or fragments thereof and which is not administered with a dendritic cell maturation factor, but for which an adjuvant is required.

30. (original) An immunogenic composition, said composition comprising:

a) an immunogenically effective amount of an antigen for which induction of long term cellular or humoral immunity is desired, said antigen prepared by either

i) conjugating said antigen with an anti-DEC-205 antibody; or

ii) utilizing a recombinant anti-DEC-205 antibody, wherein said antibody has been genetically modified to contain at least one preselected antigen on at least one preselected site on said antibody molecule;

b) a dendritic cell maturation factor;

c) a pharmaceutically acceptable adjuvant;

d) a means for delivering said composition; and

wherein said composition results in generation of antigen specific antibodies and/or CD8+ cytolytic T cells, when administered at levels of about 10 to 1000 fold lower than the effective dose of a composition wherein the antigen is not conjugated to an anti-DEC-205 antibody or fragments thereof and which is not administered with a dendritic cell maturation factor, but which requires administration with an adjuvant.

31. (original) A DNA vaccine composition comprising:

a) an isolated DNA molecule comprising at least one nucleotide sequence encoding at least one antigenic polypeptide isolated from a virus, bacterium or tumor cell against which immunity is desired;

b) an isolated DNA molecule comprising at least one nucleotide sequence encoding an anti-DEC-205 antibody or a DEC-205 binding fragment thereof;

c) a pharmaceutically acceptable carrier; and

wherein said composition, when administered with a dendritic cell maturation factor at levels of about 10 to 1000 fold lower than the effective dose of an antigenic polypeptide which is not conjugated to an anti-DEC-205 antibody or fragments thereof and which is not administered with a dendritic cell maturation factor, but requires an adjuvant, results

in efficient, vigorous and long lasting cellular and humoral immunity specific for said virus, bacterium or tumor cell.

32. (original) The composition of claim 31, wherein said nucleotide sequence encoding an anti-DEC-205 antibody or fragment thereof is selected from the nucleotide sequences set forth in SEQ ID NOS: 13 and 14, wherein said nucleotide sequences encode the heavy or light chain variable region of an anti-DEC-205 antibody.

33. (original) A method for immunizing a mammal, comprising administering to said mammal a composition of any one of claims 29, 30 or 31.

34. (original) A method for protection of a mammal from infection with a pathogen or a tumor cell comprising administering an immunogenically effective amount of a vaccine comprising:

a) a vector containing a gene encoding a protein or polypeptide from a pathogen or tumor cell or an immunogenic fragment thereof, operatively associated with a promoter capable of directing expression of the gene in the mammal; and

b) a vector containing a gene encoding the light or heavy chain anti-DEC-205 antibody operatively associated with a promoter capable of directing expression of the gene in the mammal;

c) a vector containing a gene encoding a dendritic cell maturation factor, operatively associated with a promoter capable of directing expression of the gene in the mammal; and

d) a pharmaceutically acceptable adjuvant.

35. (original) A method for long term protection of a mammal from infection with a pathogen or a tumor cell comprising administering an immunogenically effective amount of a vaccine comprising:

a) a vector containing a gene encoding a protein or polypeptide from a pathogen or tumor cell or an immunogenic fragment thereof, operatively

associated with a promoter capable of directing expression of the gene in the mammal;

b) a vector containing a gene encoding the light or heavy chain of an anti-DEC-205 antibody operatively associated with a promoter capable of directing expression of the gene in the mammal;

c) a pharmaceutically acceptable adjuvant; and

wherein said method further comprises administering the components of steps a), b) and c) with a dendritic cell maturation factor, wherein said administering results in long term protection of a mammal from infection with a pathogen or tumor cell.

36. (original) A virus-like particle (VLP) comprising:

a) at least one immunogenic polypeptide from a virus against which immunity is desired conjugated to monovalent fragments of an anti-DEC-205 antibody;

b) a dendritic cell maturation factor;

c) a pharmaceutically acceptable adjuvant; and

wherein said virus like particle, when administered at an immunogenically effective amount with a dendritic cell maturation factor at levels of about 10 to 1000 fold lower than the effective dose of a virus-like particle which contains at least one immunogenic polypeptide from a virus against which immunity is desired and which is not conjugated to an anti-DEC-205 antibody or fragments thereof and which is not administered with a dendritic cell maturation factor, results in efficient and long lasting cellular and humoral immunity specific for said virus.

37. (original) The virus-like particle of claim 36, wherein the at least one immunogenic polypeptide is obtained from a virus selected from the group consisting of a DNA virus, an RNA virus and a retrovirus.

38. (original) A method of immunizing an animal against a virus, comprising administering an immunogenically effective amount of a virus-like particle of claim 36, wherein said immunizing results in induction of long term T cell, B cell or mucosal

immunity.

39. (original) A method for long term protection of a mammal from infection with a virus, said method comprising administering an immunogenically effective amount of a virus-like particle of claim 36.

40. (original) A recombinant immunogenic composition comprising a nucleic acid molecule comprising:

a) a first nucleotide sequence encoding a chain of an antibody specific for DEC-205;

b) a second nucleotide sequence encoding at least one antigen from a virus, a bacterium, or a tumor cell against which immunity is desired;

c) a third nucleotide sequence encoding a dendritic cell maturation factor;

d) a fourth nucleotide sequence comprising a promoter for expression of a fusion protein comprising said anti-DEC-205 antibody, said antigen and said dendritic cell maturation factor; and

e) a pharmaceutically acceptable carrier.

41. (original) The composition of claim 40, wherein said anti-DEC antibody is a polyclonal antibody, a monoclonal antibody, a chimeric antibody or monovalent fragments thereof.

42. (original) The composition of claim 40, wherein said antibody chain is the light chain or heavy chain or fragments thereof.

43. (original) The composition of claim 40, wherein said antibody is selected from the group consisting of a human or humanized antibody, a mouse antibody, a rat antibody, a horse antibody, a goat antibody, a sheep antibody, and monovalent fragments thereof.

44. (original) The recombinant composition of claim 40, wherein transcription of the first, second and third nucleotide sequences are under the control of one promoter.

45. (original) The composition of claim 40, wherein transcription of the first, second and third nucleotide sequences are under the control of individual promoters.

46. (currently amended) The method of any one of claims 1, 2, ~~11,~~ 24, ~~26, 27, 29, 30, 31, 33,~~ 34, or 35, ~~36, or 40,~~ wherein said dendritic cell maturation factor is selected from the group consisting of an anti-CD40 antibody, an inflammatory cytokine, poly I/C, single strand RNA, DNA, CpG, ligation of the IL-1, TNF or TOLL-like receptor families, and activation of an intracellular pathway leading to dendritic cell maturation such as TRAF-6 or NF-κB.

47. (original) The composition of any one of claims 29, 30, 31 or 40, wherein said composition is administered subcutaneously, intramuscularly, intravenously, intranasally, orally, mucosally, buccally, or sublingually.

48. (original) The vaccine composition of any one of claims 29, 30, 31 or 40, wherein said composition induces long term T cell, B cell or mucosal immunity in a mammal.

49. (original) The compositions of any one of claims 29, 30, or 31, wherein said antigen is selected from the group consisting of a viral antigen, a bacterial antigen, a tumor antigen and any other antigen obtained from a pathogenic organism or parasite for which long term T cell, B cell or mucosal immunity is desired.

50. (original) A method for protection of a mammal from infection with a virus, a parasite, a bacterium, or a tumor, comprising administering an immunogenically effective amount of a composition of any one of claims 29, 30, 31 or 40.

51. (original) A method of immunizing a mammal, comprising administering to said mammal an immunogenically effective amount of a composition of any one of claims 29, 30, 31 or 40.

52. (original) A recombinant anti-DEC-205 molecule, comprising an antibody reactive with DEC-205 which has been genetically modified to contain at least one preselected antigen on at least one site on said antibody molecule, and at least one dendritic cell maturation factor on at least one site on said antibody molecule, wherein said antibody molecule, upon administration to a mammal, is capable of delivering said antigen to antigen presenting cells expressing DEC-205 and wherein said delivery results in highly efficient antigen presentation and induction of long term cellular and humoral immunity.
53. (original) The antibody of claim 52, wherein the at least one site may be on either the heavy chain or the light chain.

54. (original) The antibody of claim 53, wherein the heavy or light chain may be selected from the group consisting of the sequences set forth in SEQ ID NOS: 13 and 14.

55. (new) The method of claim 24, wherein the method results in priming of CD8+ T cells specific for the antigen, wherein the antigen is a non-replicating antigen or a subunit vaccine.

56. (new) The method of claim 55, wherein the non-replicating antigen is selected from the group consisting of a bacterium, a virus, a tumor cell and any other pathogenic organism for which long term immunity and protection from disease is desired.

57. (new) The method of claim 56, wherein the virus is selected from the group consisting of a DNA virus, an RNA virus and a retrovirus.

58. (new) The method of claim 56, wherein the virus is selected from the group consisting of human immunodeficiency virus, human papillomavirus, Epstein-Barr virus, herpes simplex virus, measles virus, smallpox virus, chicken pox virus, a hepatitis virus, rubella virus, mumps virus, influenza virus, and any other non-replicating virus for which long term immunity and protection from disease is desired.

59. (new) The method of claim 56, wherein the bacterium is selected from the group consisting of pneumococci, tuberculosis, Yersinia pestis, Borrelia burgdorferi, the causative agent of Lyme disease, diphtheria and any other bacterium for which long term immunity and protection from disease is desired.